

Socially Assistive Robots to aid learning of Reading Skills in Children with Dyslexia

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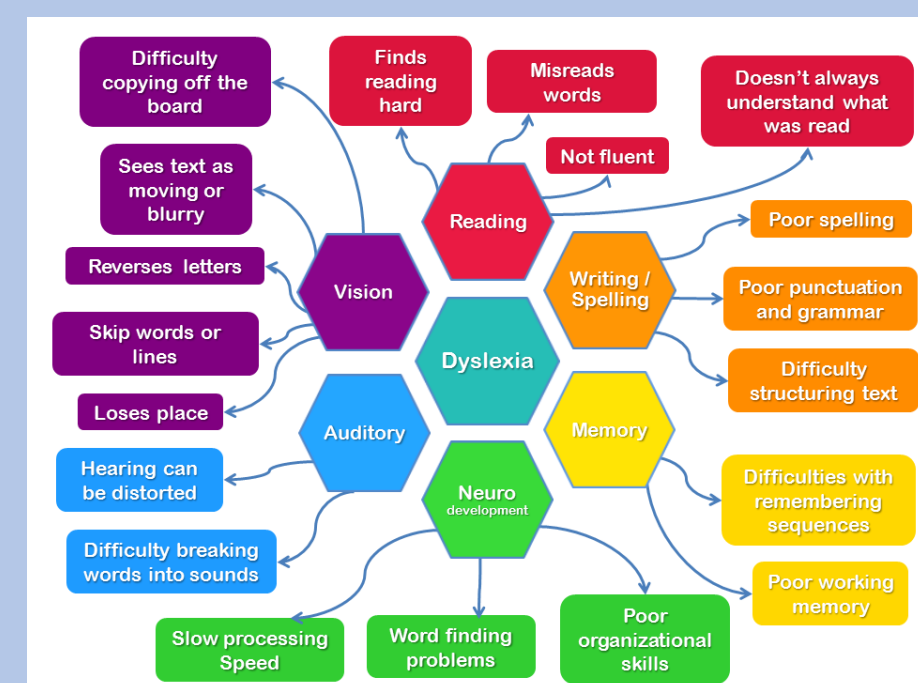
Introduction

Socially Assistive Robots are creating a revolution in today's era. They are being used in fields like healthcare, education, entertainment, services and more. In 'Children with Special Needs', robot-teacher combination has proved more beneficial than the regular teacher-student scenario in special education. The NAO Robot has been the commonly used SAR as a coach, therapy assistant and companion (1) for various learning difficulties and neurodevelopmental disorders like autism, dyslexia, cerebral palsy, dysgraphia, dyscalculia and more.

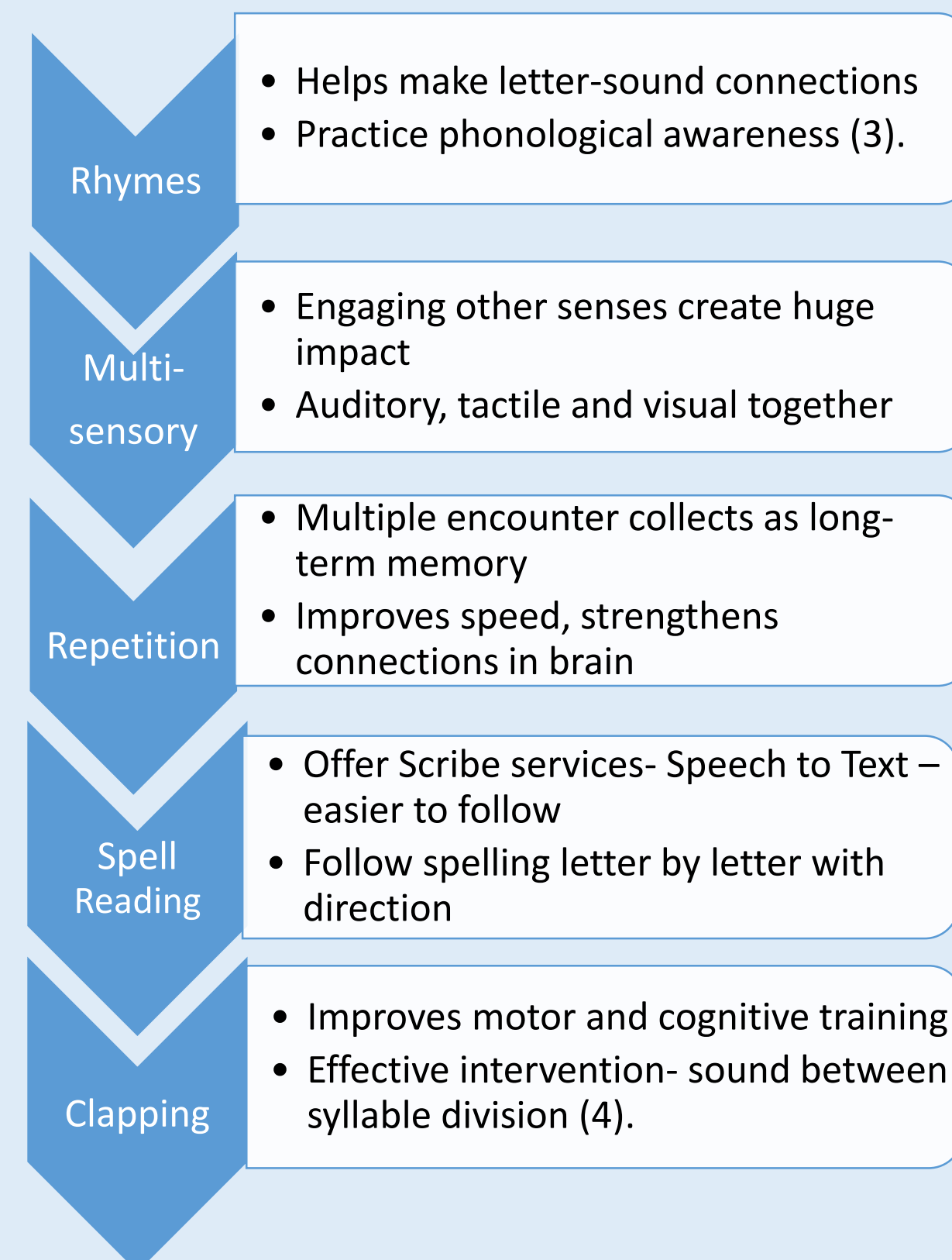
Dyslexia

Dyslexia is a learning disorder a person faces in regards to problems with visual notations in writing, reading and speech, which have phonological structure. Dyslexic people struggle most with getting words mixed up whilst they try to read and write.

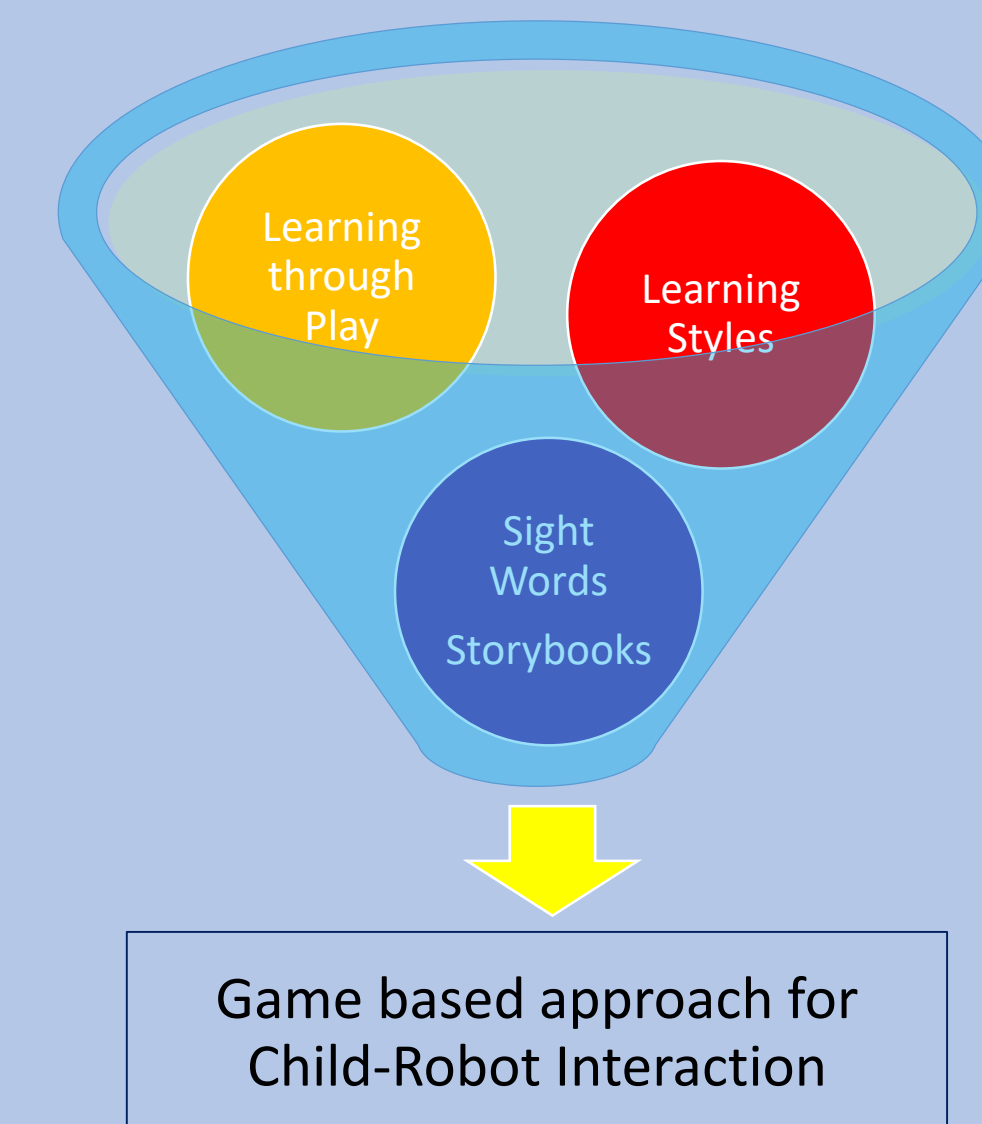
Nearly 10 percentage of the UK population suffer from Dyslexia (2), struggle all their lives believing they are incapable of learning. It is a lifelong problem that presents challenges on a daily basis.



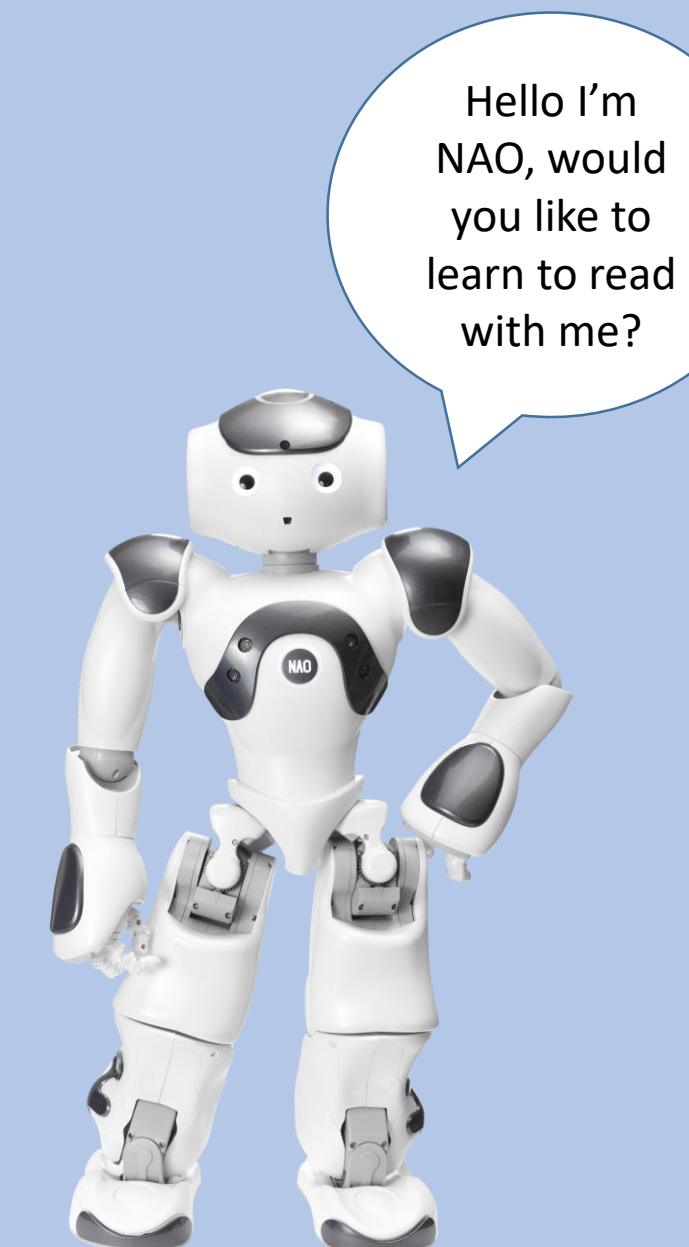
Current Pedagogical Methods



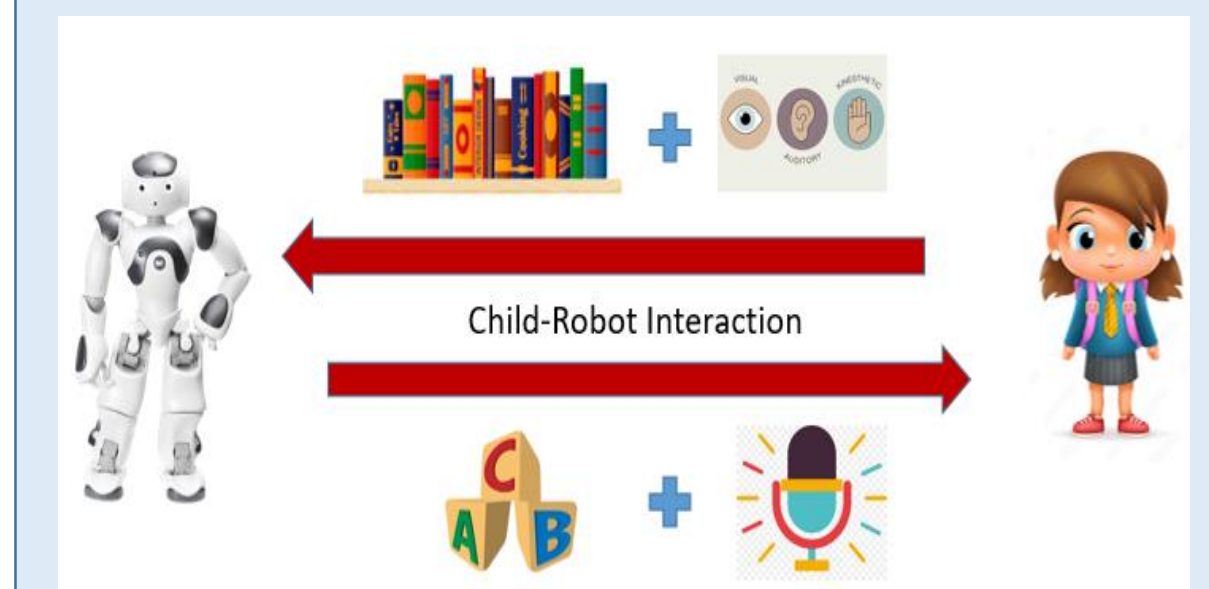
Integration



- Human Robot Interaction
- Choreographe
- Speech Recognition
- QiChat



Robot-Assisted Reading



The child would use tactile and rhyming storybooks that highlight sight words to read out to the robot. This helps enhance different learning styles by using the multisensory approach. The robot interacts with the child through action and correction of wrongly pronounced sight words through speech recognition.

Current and Future Work

- Robot repeats stories and words for the child endlessly on request.
- Robot identifies and emphasizes learning of sight words to improve vocabulary
- Human Robot Interaction experiments show that the children are more actively engaged in the presence of a robot
- Improve phonological awareness through syllable division with addition of sounds
- Integrate more pedagogical methods for effective intervention
- Extend to other difficulties faced by dyslexic children such as writing, spelling etc.

References:

- (1) Monica Pivetti, Silvia Di Battista, Francesca Agatolio, Brunilda Simaku, Michele Moro, and Emanuele Menegatti. Educational robotics for children with neurodevelopmental disorders: A systematic review. *Heliyon*, 6(10):e05160, 2020.
- (2) Dyslexia, British Dyslexia Association, <https://www.bdadyslexia.org.uk/dyslexia>
- (3) 15 Reading Development: Who Knew that Clapping Hands Could Help?, Reading Horizons At-Home Solution, <https://athome.readinghorizons.com/blog/reading-development-who-knew-that-clapping-hands-could-help>
- (4) Guided Reading Activities, Classroom Accommodations, and Teaching Strategies for Students with Dyslexia, Waterford.org <https://www.waterford.org/education/activities-for-dyslexia/>